

**AMENDMENT TO THE CLAIMS**

1 - 42. Cancelled

43. (Currently Amended) A varactor shunt switch for microwave applications, the varactor shunt switch

comprising:

a high resistivity silicon layer;

a silicon oxide layer on said high resistivity silicon layer;

an adhesion layer on said silicon oxide layer;

a metallic layer on said silicon oxide layer;

a tunable ferroelectric thin-film dielectric layer on said metallic layer, wherein said tunable ferroelectric thin-film dielectric layer has a dielectric constant of greater or equal to about 200 at zero bias, an optimized dielectric constant of 1200, and a thickness of greater than 250 nm; and

a top metal electrode on said tunable ferroelectric thin-film dielectric layer, wherein said top metal electrode defines a coplanar waveguide transmission line, wherein said top metal electrode comprises at least two ground conductors and a central signal strip.

44. (Previously Presented) The varactor shunt switch of claim 43, wherein said high resistivity silicon layer has a thickness of about 0.051 cms.

45. (Previously Presented) The varactor shunt switch of claim 43, wherein said high resistivity silicon layer has a resistivity of  $> 1 \text{ k}\Omega\text{-cm}$ .

46. (Previously Presented) The varactor shunt switch of claim 43, wherein said silicon oxide layer has a thickness of about 200 nm.

47. (Previously Presented) The varactor shunt switch of claim 43, wherein said adhesion layer comprises of titanium.

48. (Previously Presented) The varactor shunt switch of claim 43, wherein said adhesion layer has a thickness of about 20 nm.

49. (Previously Presented) The varactor shunt switch of claim 43, wherein said metallic layer further comprises:

- a gold layer on said adhesion layer; and
- a platinum layer on said gold layer.

50. (Previously Presented) The varactor shunt switch of claim 49, wherein said gold layer has a thickness of about 400 nm.

51. (Previously Presented) The varactor shunt switch of claim 49, wherein said platinum layer has a thickness of about 100 nm.

52. (Previously Presented) The varactor shunt switch of claim 43, wherein said metallic layer has a thickness of about 500 nm.

53. (Previously Presented) The varactor shunt switch of claim 43, wherein said metallic layer is deposited and lifted off by electron beam deposition and standard lift-off photolithography.

54. (Previously Presented) The varactor shunt switch of claim 43, wherein said metallic layer is deposited and lifted-off by sputtering and standard lift-off photolithography.

55. (Withdrawn) The varactor shunt switch of claim 43, wherein said metallic layer comprises of at least two ground conductors and a shunt conductor.

56. (Withdrawn) The varactor shunt switch of claim 55, wherein said at least two ground conductors have a width of about 150  $\mu\text{m}$ .

57. (Withdrawn) The varactor shunt switch of claim 43, wherein said tunable ferroelectric thin-film dielectric layer is comprised from one of barium strontium titanium oxide, strontium titanate, or combinations of any other nonlinear electric field tunable dielectric thereof.

58. (Withdrawn) The varactor shunt switch of claim 43, wherein said tunable ferroelectric thin-film dielectric layer is comprised of barium strontium titanium oxide.

59. (Previously Presented) The varactor shunt switch of claim 43, wherein said tunable ferroelectric thin-film dielectric layer is deposited by pulsed layer deposition.

60. (Previously Presented) The varactor shunt switch of claim 43, wherein said tunable ferroelectric thin-film dielectric layer is deposited by RF sputtering.

61. (Withdrawn) The varactor shunt switch of claim 43, wherein a varactor area of said varactor shunt switch is defined by the overlap of said top metal electrode and said metallic layer.

62. (Withdrawn) The varactor shunt switch of claim 61, wherein said varactor areas between about  $1\text{ }\mu\text{m}^2$  to about  $500\text{ }\mu\text{m}^2$ .

63. (Withdrawn) The varactor shunt switch of claim 61 has a shunt resistance equal to one divided the product of  $\omega$ , the capacitance of said varactor area and the loss-tangent of the ferroelectric thin-film.

64. (Withdrawn) The varactor shunt switch of claim 63, wherein the lossy nature of said varactor is modeled by said shunt resistance.

65. (Cancelled)

66. (Currently Amended - Withdrawn) The varactor shunt switch of claim ~~65~~ 43, wherein said central signal strip has a width of about  $50\text{ }\mu\text{m}$ .

67. (Currently Amended - Withdrawn) The varactor shunt switch of claim ~~65~~ 43, wherein said at least two ground conductors have a width of about 150  $\mu\text{m}$ .

68. (Currently Amended - Withdrawn) The varactor shunt switch of claim ~~65~~ 43, wherein said top metal electrode has a spacing between said central signal strip and said at least two ground conductors of about 50  $\mu\text{m}$ .

69. (Currently Amended - Withdrawn) The varactor shunt switch of claim ~~65~~ 43, wherein said top metal electrode has a spacing between said at least two ground conductors and said central signal strip that has a geometric ratio equal to about 0.333 of said coplanar waveguide transmission line.

70. (Withdrawn) The varactor shunt switch of claim 43, wherein said varactor shunt switch is normally in an "OFF" state at 0 V.

71. (Withdrawn) The varactor shunt switch of claim 43, wherein said coplanar waveguide transmission line has about 40 to about 50  $\Omega$  characteristic impedance.

72. (Withdrawn) The varactor shunt switch of claim 43 has an area of approximately 450  $\mu\text{m}$  by approximately 500  $\mu\text{m}$ .

73. (Withdrawn) The varactor shunt switch of claim 43 has a parasitic line inductance equal to the characteristic impedance of said coplanar waveguide transmission line divided the product of  $2\pi$  and the operating frequency multiplied by the sine of the product of  $2\pi$  and the length of the line shunting to ground divided by the guide-wavelength.

74. (Withdrawn) A method of fabricating a varactor shunt switch, the method comprising:  
depositing an adhesion layer on a high resistivity silicon substrate by electron-beam  
deposition and lift-off photolithography;

depositing a metallic layer on said adhesion layer by sputtering and lift-off photolithography;  
covering said metallic layer with a layer of ferroelectric thin film by RF sputtering, wherein said metallic layer comprises of at least two ground conductors and a shunt conductor and said layer of ferroelectric thin-film has a dielectric constant of greater or equal to about 200 at zero bias, an optimized dielectric constant of 1200, and a thickness of greater than 250 nm;  
topping said layer of ferroelectric thin film with a top metal electrode by sputtering and lift-off photo lithography, wherein said top metal electrode comprises of at least two ground conductor and a center conductor; and  
capping said top metal electrode with a coplanar waveguide transmission line comprised of at least two ground conductors and a signal strip.

75. (Withdrawn) The method of fabricating a varactor shunt switch of claim 74, further comprising:

tuning the capacitance of said varactor shunt switch by applying a dc electric field between said ground conductors of said metallic layer and said top metal electrode and said signal strip of a coplanar waveguide transmission line.